DOCUMENT RESUME

ED 335 397 CE 017 031

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TITLE Phases of Reasoning Along a Developmental Continuum: Implications for Instruction of Housing Programs. Draft.
PUB DATE Apr 91
NOTE 31p.; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, April 3-7, 1991).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Achievement Tests; Adults; *Cognitive Processes; College Faculty; *College Students; Comparative Analysis; Data Collection; Graduate Students; Higher Education; *Home Economics Education; *Housing; *Individual Development; Problem Solving; *Thinking Skills
IDENTIFIERS *Phases of Reasoning

ABSTRACT

The notion that reasoning develops in distinct phases of thinking as individuals progress from simplistic learning of facts to predicting integrated relationships was explored as subjects considered housing issues. Suggestions for developing and instructing housing programs are presented. Subjects included 13 students and faculty members at three levels of learning: (1) novice beginners, consisting of undergraduates; (2) intermediates, who were baccalaureate holders and graduate students in housing programs; and (3) experts (faculty members and professors in the university housing department). Data were collected using a demographic questionnaire, an achievement test, a semistructured interview, and a problem-solving activity. A systematic progression of reasoning about housing issues was evident in these subjects, and it is suggested that individuals and families experiencing housing selection problems might show a similar progression of reasoning with experience. Implications for home economics education are discussed. This phases-of-reasoning instructional prototype provides insight for the design of housing instruction that makes reasoning explicit from a problem-solving perspective. Appendix A illustrates the cognitive processes of the three groups of subjects. Appendix B lists housing concepts expressed within the groups. Two tables and one figure illustrate the discussion. A 27-item list of references is included. (SLD)

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PHASES OF REASONING ALONG A DEVELOPMENTAL CONTINUUM: IMPLICATIONS FOR INSTRUCTION OF HOUSING PROGRAMS

A PAPER PRESENTED AT THE ANNUAL MEETING OF
THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION
CHICAGO, 1991
(Draft)

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Phases of Reasoning Along a Developmental Continuum: Implications for Instruction of Housing Programs

The purpose of this paper is to explore the notion that reasoning develops in distinct phases of thinking as individuals journey from simplistic learning of facts to highly proficient consequence predicting of integrated relationships. The results reported here were derived from a study which examined the thinking processes and problem solving actions of individuals at different levels of learning in a housing program at a major research university. After reviewing the underlying theoretical framework and methodological issues, the findings will be discussed. Finally, suggestions for developing and instructing housing programs will be presented. Instruction that incorporates housing selection activities which allow for predicting the consequences of varied alternatives as a means for developing and practicing reasoning abilities will be constructed.

Theoretical Framework

Theoretical perspectives that accomodated both the ill-structured nature of real-life problem solving typically done by individuals and families and phase progression of reasoning were used to conceptualize this study. These paradigms were drawn from family systems and cognitive research literature.

Recent housing research efforts which describe families from family systems or problem solving perspectives have focused upon interdisciplinary relationships among homes, neighborhoods, and the well-being of people and their communities (Paolucci, Hall & Axinn, 1977; White, 1986; Wysocki & Carll,

1989). An interdisciplinary perspective is viewed as an integration of economic, political, historical, social, and environmental systems that affect housing production and distribution among individuals and families. Housing, which constitutes one of the largest expenditures in an individual's lifetime, recently has received increased attention due to fluctuating interest rates, revisions of tax laws, energy concerns, changes in the cost structure of the housing industry, affordability issues, and the increasing numbers of homeless families found in our nation (Memken, Johnson, & Vance, 1989). Multiple housing alternatives, large quantities of changing housing information, coupled with complex affordability constraints, and less predictable resources are challenging the well-being of individuals and families as they attempt to meet current and future necessities of shelter (Bratt, Hartman, & Meyerson, 1986; Gitman, 1986; Gitman & Joehnk, 1990). Insight into how individuals develop reasoning processes and proceduralize technical, economic, and legal knowledge appears to be useful when reasoning about and making sound judgments concerning housing and its consequences in a changing global environment.

A growing body of cognitive research literature on teaching critical thinking and problem solving has concentrated largely on well-structured classroom situations (Chi, Feltovich, & Glaser, 1981; Larkin, McDermott, Simon, & Simon, 1980; Newell & Simon, 1972; Sternberg, 1985). Less is known about how individuals represent and reason about problems that occur in real-life everyday situations (Rogoff & Lave, 1984; Resnick, 1987). Although cognitive research has indicated that successful problem solving performance requires extensive, readily accessible knowledge that can be applied to the problem

situation and the ability to make sound judgments for intended goals and subsequent consequences (Anderson, 1985; Glaser, 1986; Kerka, 1986; Perkins, 1986; Shuell, 1990), there is limited understanding of how individuals develop reasoning abilities when confronted with real-life problems. This study sought to understand how individuals develop in their thinking processes when challenged by everyday life situations as securing shelter.

Reasoning by definition is "that form of thinking in which the reasoner is usually aware that a judgment is dependent upon other judgments or premises" (Nickerson, 1986, p. 346). When confronted with a range of alternatives in real-life situations, to make sense out of what is possible and what is probable involves a deeper level of understanding or use of reasoning processes on the part of the individual in establishing personal meaning (Shuell,1990). Reasoning processes involve the mental activities of making comparisons among facts and concepts, identifying relevant similarities and differences, and the ability to generate hypotheses about possible alternative meanings and relationships with supporting feedback and evaluation of outcomes (Nickerson, 1986; Shuell, 1990; Sternberg, 1985). Thus the learner is an active participant in constructing meaning as new information is integrated with prior knowledge.

A deeper level of understanding and reasoning ability is thought to develop systematically in stage progression as the individual passes through a series of qualitatively different cognitive understandings presumed to change with amassed knowledge and practical experience (Carey, 1985; Dreyfus & Dreyfus, 1986; Patel & Groen, 1988; Shuell, 1990). Recent studies in expert-novice research indicate that individuals develop thinking processes and proceduralize knowledge in qualitatively different ways (Dreyfus & Dreyfus, 1986; Glaser,

1986; Patel & Groen, 1988, Shuell, 1990), including more efficient organization of knowledge (Marshall, 1988), and the ability to infer more from less information (Dillon & Schmeck, 1983). As individuals journey through learning they first engage in memorizing facts and rules, followed by a phase of grouping and organizing these facts and rules into more meaningful structures, and finally integrate knowledge in order to anticipate occurrences and make predictions that facilitate transfer to new and different situations. This study sought to explore such an understanding of reasoning by individuals and families as they considered housing issues. Phase theory, in part, provides some evidence to support developmental stages of reasoning which has direct implications for the generation of instruction in housing programs.

Methodology

Students and faculty at three levels of learning (novice beginners, intermediates, and experts) from a land grant university home economics housing program formed the data base. Thirteen subjects were selected on the basis of two criteria: a) personal and professional housing experience and b) housing domain knowledge. Criteria selection drew from the stage progression model of Dreyfus & Dreyfus (1986) which posits that experience-based skill acquisition develops from a sound educational base. An "experience in years" scale was developed to sort subjects into proficiency levels. The novice group consisted of undergraduate level students ranging from sophomores to graduating seniors majoring in housing. An intermediate group included baccalaureate degreed and graduate level students in housing programs, while the expert group represented the teaching faculty and professors in the housing department.

Two separate but integrated investigations used a demographic questionnaire, achievement test, semi-structured interview, and a problem solving activity as data collection procedures. An achievement test examined housing specific knowledge differences among the three groups for purposes of differentiating subjects into proficiency levels. Scoring included means, standard deviations and Kruskal-Wallis One-Way Analysis of Variance.

Subjects were interviewed using open-ended questions that focused upon personal meaning of housing, identification of major housing problems families currently face, and national housing policy issues. The audio-taped interviews were transcribed and analyzed using protocol analysis procedures (Ericsson & Simon, 1984) for segmenting, coding and diagramming these verbal reports. Coding verbal protocols involved separating each sentence into discrete phrases determined by a pause in the recorded protocol. These were segmented into smaller units determined by detailed definitional categories. Statements were coded into categories that used an adaptation of Perkin's Knowledge as Design framework (1986) and Voss, Tyler, & Yengo (1983) model of social argumentation. This framework provided explanation for the organization of a subject's thinking processes that were identified as structure, component, reasoning, outcome, affective responses, and example statements. Coded categories and definitions were as follows:

• **Structure Statements (STS)** -- The overall pattern of organization that expresses a framework of understanding. Primary statements that identify the focus of attention, the primary idea or belief being expressed.
(The focus of attention. The framework)
Example: " It is the study of social and physical aspects. "
"In the broadest perspective it is a system, a delivery system."

• **Component Statements (CMS)**--Knowledge about particulars, essential features or supporting features of domain-specific knowledge. Statements that organize ideas or facts into categories, lists or labels. Statements that elaborate upon particulars or provide detail or exactness in describing the essential features of domain-specific knowledge. Statements that expand upon concepts and ideas. Declarative knowledge. (Identify what features are and add further detail)

Example: "As far as physical is concerned, it is design features, layout within the residence and the physical surroundings". " A place where you kind of renew yourself from the pressures of the world."

• **Reasoning Statements (RES)**--Statements that provide evidence of meaning by linking concepts which describe the operation, function and relationships of systems, and subsystems as a whole. Reasoning may be deductive (to infer from what precludes), or inductive (to combine assumptions and hypotheses by inferring from particulars). The rules, principles, or theories behind that provide argument for cause and effect. (Arugments for why, the theories and principles reflecting relationships of systems. Argument that explain and evaluate the influence of)

Examples: "Well, first of all people have an infinite number of wants and needs and desires, and our nation has a limited number of resources and capabilities of fulfilling those desires." "That is partly the government's fault, the government's reaction to low energy prices." It has nothing to do with income per se, but where you get your money from."

• **Outcome Statments (OTS)** -- Statements that relate to consequences or results of identified actions. The end products of an action. Statements that provide conclusions and solutions. (Actions, end products, results)

Examples: "Being close to neighbors, that affects the social environment." "They never have the opportunity to get higher housing." "The lack of opportunity, it limits where you work and

live."
"The government needs to provide more affordable housing."

• **Affective Response Statements (ARS)**-- Statements that are based upon personal beliefs, opinions, and feelings, that are independent of domain related knowledge.
(Personal beliefs)
Examples: "I attach meaning of home not to a building but to a place where I feel a sense of belonging." "It is not one of my priorities." "It takes on more meaning to me than it would to someone else." "I would never have that kind of house."

• **Example Statements (EXS)**-- Statements that provide an actual example of a concept or idea being expressed. Examples of images, models that are new to the group in question.
(Model cases, examples of specific instances)
Example: "I consider my parent's home home because it is always there." " Well, look at the Selby-Dale area in St. Paul." " Everything like TV's and all that stuff."

• **Uncategorizable Statements (UCS)**-- Statements that do not meet the definitions of the preceding definitions. Examples: "I don't know.

During the second investigation using a simulated housing selection problem solving activity, subjects were instructed to "think aloud" (Ericsson & Simon, 1984), or to verbalize all their thoughts as they solved four housing related problems. Four problem solving scenarios were constructed to reflect common housing problems of single parents, low income families, the elderly, and community development focused upon housing policy. A Tab Item testing technique (Glaser, Damrin, & Gardner, 1954) designed to measure individual performance was used to track the sequence of problem resolution that each individual used while they generated problem solving action plans and tested

the consequences of these plans.

Differences in the organization of subjects' thinking and reasoning processes were assessed. Data were analyzed using descriptive and nonparametric statistics (Kruskal-Wallis one way analysis of variance) to quantify subject's content knowledge and to differentiate levels of expertise. Content and protocol analysis procedures (Ericsson & Simon, 1984) revealed quantitative and qualitative differences in knowledge organization and reasoning patterns during the problem-solving activity. Differences were plotted for illustrative purposes on cognitive process maps. Similarities and differences were compared among and within groups. (See Appendix A)

Findings and Discussion

These results suggest that progression of reasoning develops along a continuum ranging from reasoning by recognition of physical housing descriptors, to identification of functional operators that housing performs, and finally reasoning by making predictions about integrated physical, social, economic, political and cultural relationships. Findings revealed significant differences among groups in proportion of concepts verbalized, achievement test scores, and in proportion of outcome and reasoning statements generated from interview sessions and the problem solving activity.

These differences in thinking patterns among experts, intermediates, and novices suggest that information for the expert group is organized by function or reason which cues general housing information, while novices and intermediates cue general feature housing information before considering reasons for their choices. The following are examples of verbal responses to the query "what are the major housing problems families are facing?":

Novice responses

N030 "Families (STS), a lot of the families are larger (CMS) there are a lot of families out there with 5, 6 kids (CMS) that's amazing because they always say 1.8 children for family (RES). It comes down to the low income (RES) and there isn't enough housing out there for those low income that have 5 and 6 kids and they are sleeping one on top of another in these houses (OTS)."

Intermediate responses

AB060 "I think affordability (STS). It is the major problem because even looking at the existing housing stock versus new construction taking both of those into account affordability is still the basic issue (RES). If you are going to do rehab work with existing housing or build new housing, affordability is an issue and that boils down to accessibility (RES). Who has access to housing, people who can afford it (OTS)."

Expert responses

E010 "Well that's pretty broad, unless you segment the market(RES). I think different families face different problems (RES). I live in a neighborhood that has a lot of starter homes(EXS). A lot of those people are trapped in those starter homes after buying into that thinking this is a first time home and we'll move to another neighborhood (CMS) because then they find that those choices aren't available due to economic reasons (RES)."

In constructing a Housing Concept Taxonomy from the subject's verbal responses, differences in complixity of knowledge from which decisions are derived were evident. See Appendix B for complete details of the taxomony.

Novices based housing decisions on surface feature-based rules, and reasoned by comparing physical aspects of housing with family income and expense resources. Acquired domain knowledge is organized by labels,

classification, and matching features. Validation of goals by novice subjects involved rule-based matching of housing features to family situation. These reasoning patterns are indicative of inexperience from lack of experience and acculumated knowledge of housing content.

Intermediate subjects linked individual and family needs with factors that influence housing within local communities. Intermediates reasoned by applying rules related to physical and economic factors. Reasoning about the functional meaning of housing and its impact upon its users was prevalent among intermediates, indicating understanding of concepts and association of relationships. Validation of goals included matching compatibility of families with potential housing selection actions. Intermediates expressed understanding by integrating functional relationships of housing, its users, and public affairs operating within local communities.

Experts based decisions upon interaction between families and broad contextual social, economic, physical, political, and cultural criteria. Experts reasoned about functions of housing, but also integrated relationships of global world contexts that impact housing decisions. Validation of intended goals was conducted using consequence testing procedures. Ability to anticipate and predict implications of varied housing situations that linked housing and its users with the community and the world at large existed among experts. These data suggest that as individuals learn more about the subject matter and practice direct application of acquired knowledge, principle-based hypotheses can be developed that aid in reasoning about and making judgments from a holistic approach.

The following excerpts illustrate expert's reasoning about adequate

housing integrating several conceptual arguments in their reasoning from a global perspective:

E010.

" All of our public policies deal with minimum or compromises and from that perspective it is no wonder we have housing problems.

What happens is not what is needed and desirable, it is what we can get a city council or a state legislator to vote for.

It is not based on what is the quality environment for people to live within.

If one doesn't feel they can have a retreat, privacy, they lack a sense of control over it.

It is more than square footage measures, it has to do with values people come with into that housing."

E121

" Adequate housing in my parlance means more than simply shelter.

On the dwelling basis this means the type of physical environment both internal to the house and external to the house that gives the individual and family meaning in their lives.

Adequate housing policy has no meaning at all because there is no demand for new units let alone existing units on the range.

There has always been a using housing as a counter cyclical balance for national economic policy approach.

Generally speaking national housing policy is really determined more by the Internal Revenue Code and the Federal Reserve in terms of interest rates and reserve requirements than by anybody sitting down to say what adequate housing should be".

Intermediate subjects' reasoning suggests a reliance upon personal beliefs linking housing with communities and public affairs issues. This type of reasoning regarding adequate housing is illustrated in the following excerpts:

C050

"I personally am not going to believe that everybody needs the best.

I think that there are a lot of people that are out there getting assistance that don't necessarily need it.

I think the programs are far too available.

I think the idea of suitable home for everybody, I think that is okay as long as all the individuals are working to attain that for themselves.

Because I don't think that is a basic human right.

I don't really agree with the government involvement to the degree that they are".

AB 060

"I think adequate housing has to look at other factors besides just the shelter.

I think it has been one of the policies that the government has said yes this is something we must do, but I don't think it is a concept or a policy that the majority of the people have bought into yet.

I think there is a real consensus for the majority of people that this homeless issue is a brand new issue and it really isn't a sudden thing.

It has been an issue for a long time it is just that there is more media attention".

Novice subjects reasoned by rephrasing a single concept several times as is illustrated with the following excerpt regarding adequate shelters:

N070

"They need to have a place. A shelter isn't a place where they can feel secure or feel like there is love or that they can return to when they need to.

They need to have a home, somewhere they can call their own.

We are having problems because people don't see.

They just need to open their eyes. People don't realize how

big a problem it is because they don't see it in their own neighborhood and they don't pay attention to it when they are driving through the downtown area, or where the homeless populus is big.

It is not affecting them personally, they are not on their doorstep".

N030

"There are problems with providing adequate housing in public housing programs. What I see is the problem with it is that people get reliant on this, on these programs.

They are able to get that money and get 30% of their income for rent and only pay that.

So they are reliant on the government helping them.

And the government doesn't help in another sense that they should be also coming up with programs to help them go out on their own.

These people are getting so reliant on the programs,they can't stay on them forever. It is going up through the generations".

These findings on the progression of reasoning suggest that as individuals acquire specific knowledge about a subject matter, the ability to associate meaning with facts increases along with capabilites to reason about the application and consequences of that knowledge. Novices at a classification level, attach labels to housing content and match features as a means of understanding and reasoning. Intermediates at the understanding level, associate meanings by linking concepts about events and phenomena as a means of understanding and reasoning about housing content. Experts at an anticipation level discriminate and apply housing relationships to varied problem situations and reason by making predictions about these relationships.

Differences in the qualitative nature of reasoning and type of

validation used thether consequence testing or judging compatibility of rule based decisions can be observed in the following examples:

Novice Responses:

1st episode. "But I figure that if they want to get out, they can maybe take, get help from the government in subsidized housing (ATP)123. If they really want their own home which would have to probably be a 3 bedroom home, the master bedroom for the parents, and probably a special room for the daughter, and the boys would have to share (ATP)124 even though they are 5 years apart (EVL)125.I don't think they could afford a 4 bedroom home(EVL)126." *Compatibility judgments*
"They are going to have to put down a down payment if they want a house (ATP)129. I would say that their house shouldn't be more than $50,000 (EVL)130. *Compatibility judgment*

2nd episode. "I might suggest a duplex where they are living with one other family (ATP)134. If they rent they wouldn't have to worry quite as much about lawn and maintenance because usually duplex owners take care of their house more than apartment landlords do (EVL)136.*Consequence testing*
But when they come I will suggest either a three bedroom house or a duplex (ATP)138. *Compatibility judgment*

Intermediates Responses:

1st episode:" So if they are making $35,000 a year (ACG)50 They can afford a pretty nice house (ATP)51 In the neighborhood of $70,000 "(EVL)52. *Compatibility judgment*
2nd episode:"Maybe bearing down real hard and trying to save up a couple thousand dollars to come up with the downpayment on the house (ATP)87. But there should be -I would- I don't see any problem with them getting a house" (EVL)88 *Compatibility judgment*
"There are a lot of first time home buyers programs around (ATP)91. You just have to get into the phone book and start asking people about what the options are "(ATP)92.*Compatibility judgment*

Expert Responses:

1st episode: " What I would like to do with the clients, following this very quick review of background infomration, is sit down, probe really what the thinking is between staying within the same neighborhood and community (ATP)132. As well as how strong a home ownership interest might be (ATP)133. I would like to explore if that home ownership option is desired on their part what might be some plans, especially given the fact that one of the children has a progressive physical handicap that for which there might be some assistance available (EVL) 136. *Consequence testing*
Clearly we need to examine that whether it is rental or ownership and see what are the options" (ATP)137 *Compatibility judgment*
2nd episode: " The employment situation of both the adults in the household needs to be verified for stability (ATP)147 Their financial situation is relatively borderline and may create some financial problems for long term commitments such as a home purchase " (EVL)148 *Consequence testing*

In summary, a systematic progression of reasoning about housing issues has been evidenced in the problem solving protocols derived from the subjects of this study. Based upon the results of this study, it might be inferred that individuals and families who are experiencing housing selection problems may, like the novices who had little housing-specific knowledge or experience with housing selection, make housing decisions that are based upon basic surface features such as the economics of family income and expenditures and physical housing forms. Decisions based upon these basic criteria omit the complexity of the dynamic and multiple external factors that also influence what happens to housing as economic, social and legal changes occur. As interest rates, rents, morgage payments, tax structures, and building costs rise which decrease the opportunities for affordable housing, decisions that were based upon basic economics or rule based are not sufficient.

Families who imitate intermediates and experts with housing knowledge

about community resources, distribution of housing and its impact upon families and neigbhorhoods, and regional patterns can better interpret housing concerns based upon the consequences of these interacting influence and be able to predict and anticipate changes in areas of housing. Care must be exercised in the interpretation of the results of this study so as not to generalize beyond the scope of this group of subjects. Additional research is needed to determine whether individuals reasoning progresses in similar phases in other disciplines as well.

Implications for Home Economics Education.

These results have implications for the structuring of learning designed to facilitate the development of phases of reasoning. Reasoning may be structured by understanding domain knowledge ,what is?; associate meaning with facts, what does it mean? ; reasoning and applying knowledge to goals, where does this apply?; and reasoning about consequences of actions, what will the results be if, then?

(Insert Figure I here)

Instruction during the first phase of learning should promote construction of reasoning at the understanding level. For example, housing content is made explicit, features are introduced, and elaborations about the particulars of housing is provided. Information acquired during this initial phase is concrete rather than abstract in nature and is linked to the specific context in which it occurs. Meaning of housing and its interaction with social, legal, political, and cultural factors is also made explicit and may involve more-or-less isolated facts. These facts can be applied and practiced through problem solving activities. Problems should be simple and include a minimum

of operations and be presented in situations which are familiar to the learner. Another activity that promotes such learning is Socratic questioning. This mode of questioning probes learners for the meaning of, justification for and line of reasoning that they hold. Such activities- problem solving and Socratic questioning- extend exchange between different points of view or frames of reference. Instruction that is designed to incorporate reasoning activities which allow for predicting the consequences of varied alternatives of housing issues allows individuals to begin to practice problem solving in classroom situations where errors have smaller consequences than in real life.

At the second level of reasoning, association of meaning linked to events and phenomena in the near environment (community) is focused upon. By grouping, organizing, and seeking similarities and differences among physical, social, economic, legal, cultural, and political relationships a deeper understanding of the housing content evolves. Information acquired during the first phase is now applied to the solution of new and more varied problems involving greater complexity of resolution. Problems presented at this stage will be more complex, contain more irrelevant features, and the number of operations to solve will be increased. New housing concepts need to be introduced and linked to personal and community factors that affect individuals and family. Meaning through instruction is made less explicit in this phase, thus allowing the individual to take more responsibility in constructing meaning and making associations with prior learning. Use of problem solving activities and Socratic questioning that probe and challenge reasoning abilities at the level of ability and understanding can be carried out in a variety of ways.

During the final phase, knowledge and reasoning formed during the

previous phases becomes more integrated as relationships can be discovered among broad categories of concepts. Individuals at this level are capable of anticipating occurrences and can make predictions that facilitate transfer of knowledge to new and different situations. Housing content at this level is abstract. Problem solving experiences that allow for prediction and anticipation of consequences of housing decisions with implications for families in global perspectives are suggested. These problems should be complex problems that focus on housing policy and beliefs that direct policy making. Such activities provide learners with opportunities to view themselves as functioning within a global invironment. Socratic questioning at this level would take on new levels of understanding as individuals delve deeper into reasoning within more than one perspective.

This phases of reasoning instructional prototype provides insight for the design of housing instruction that makes reasoning explicit from a problem solving perspective. Phases of reasoning can be useful to help instructors and the learners themselves diagnose reasoning capabilities in order that movement can be made to higher levels of thinking and reasoning. Activities as paired problem solving and Socratic questioning would aid individuals in developing an understanding of the dynamics of housing in a changing environment.

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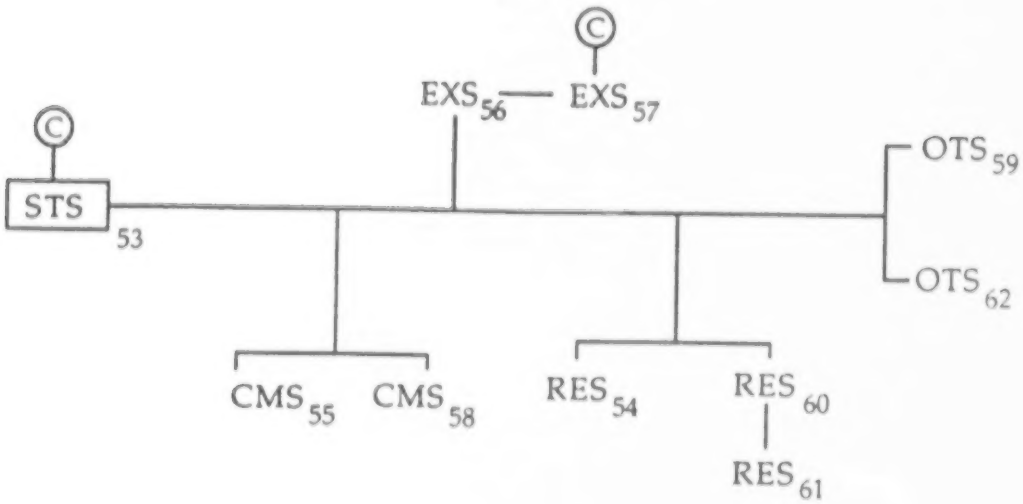
APPENDIX A

Example 1

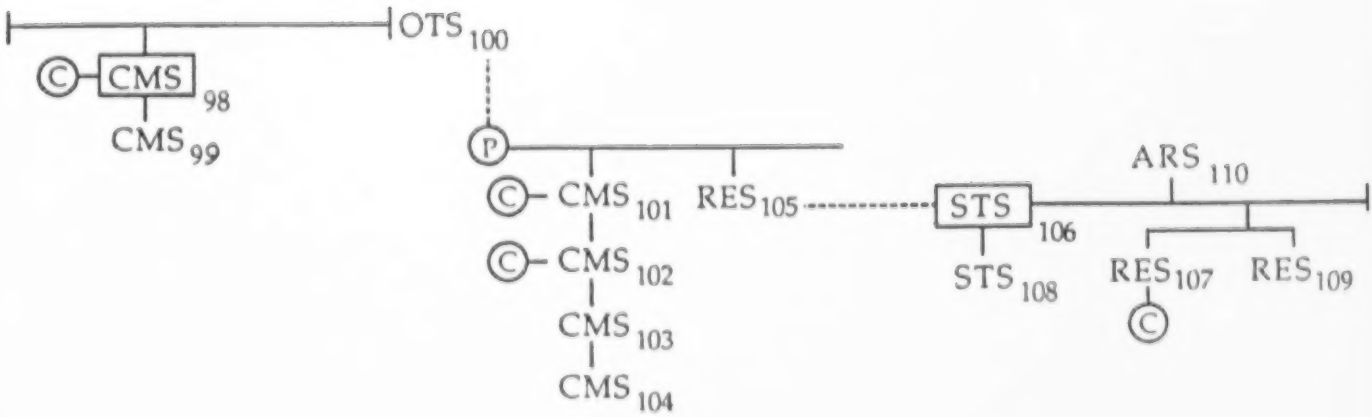
NOVICE
COGNITIVE PROCESS TREE N070

Q#6A



INTERMEDIATE
COGNITIVE PROCESS TREE AB001

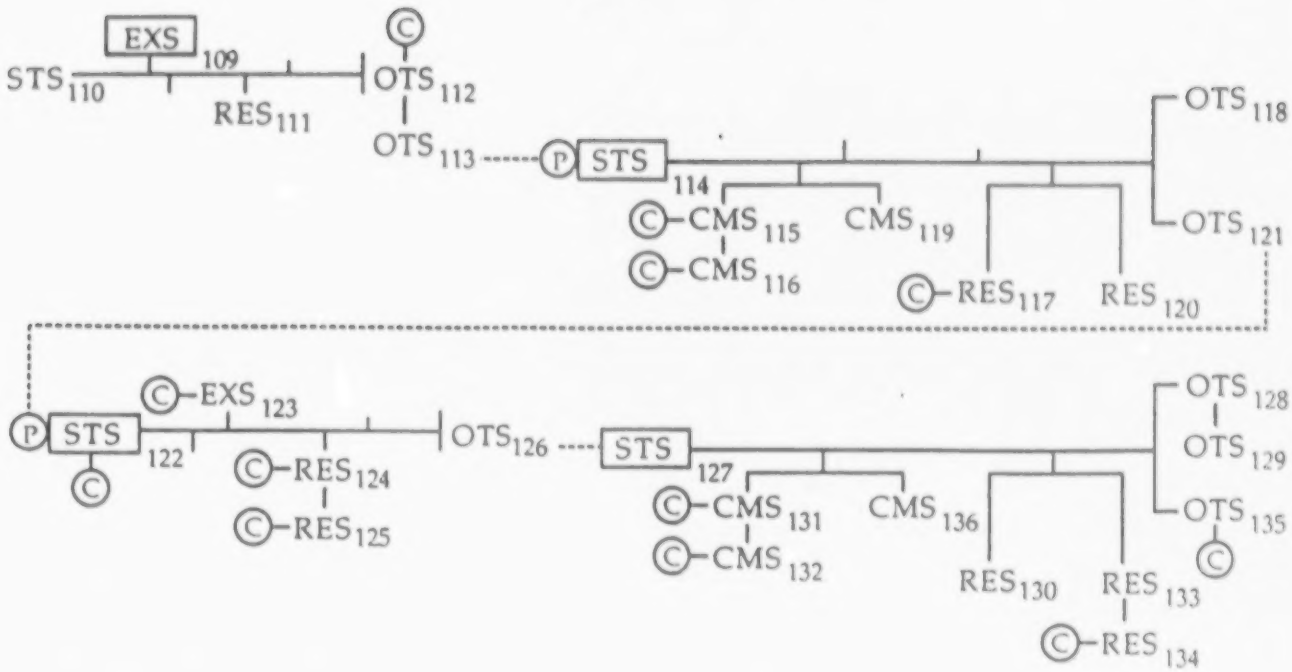
Q#6A



Expert

COGNITIVE PROCESS TREE E131

Q#6A

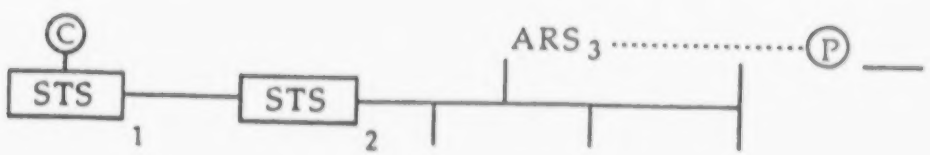


Example 2

NOVICE

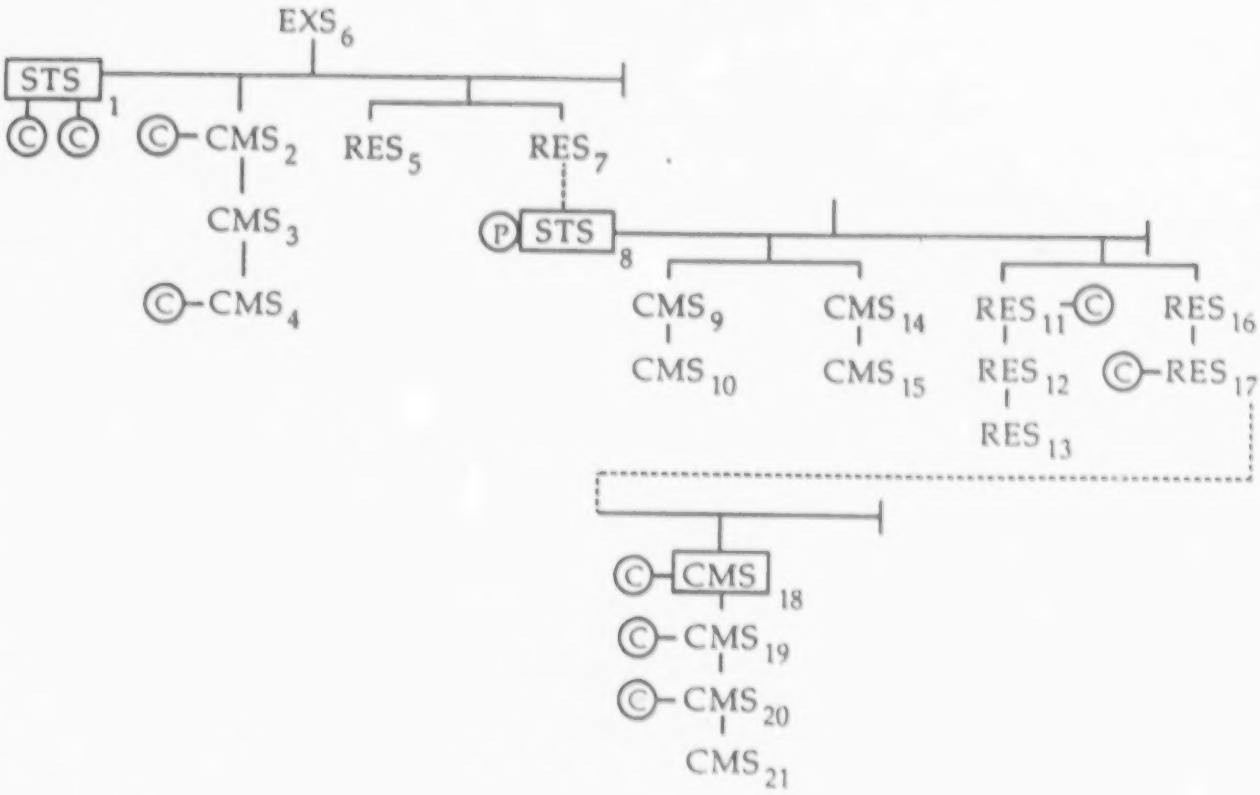
COGNITIVE PROCESS TREE N070

Q#1



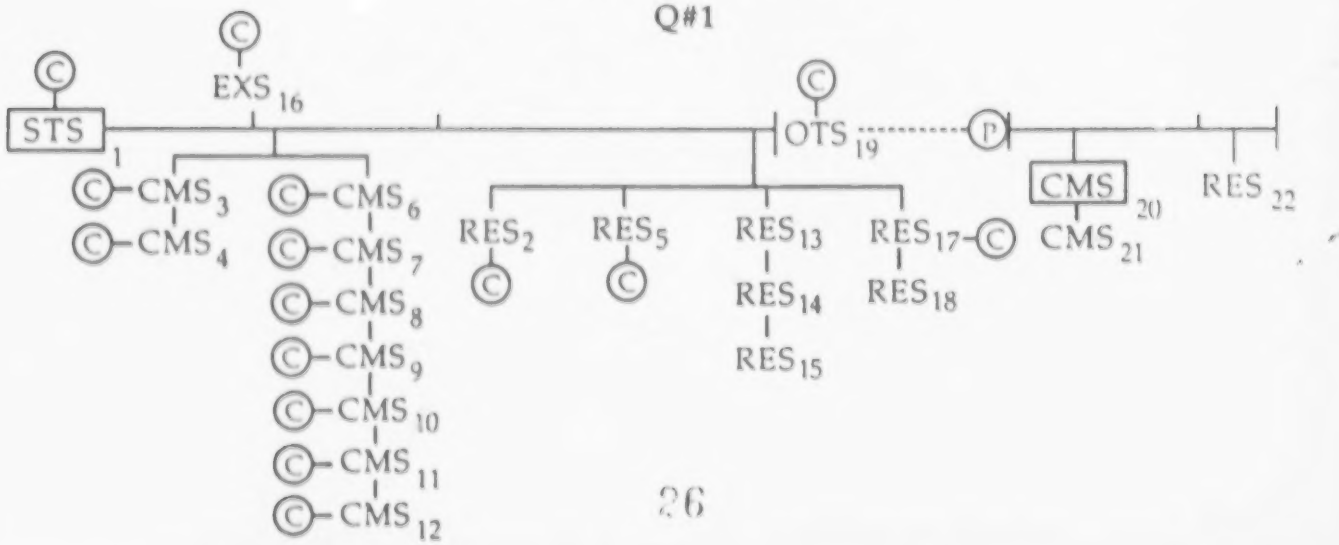
COGNITIVE PROCESS TREE AB060

Q#1

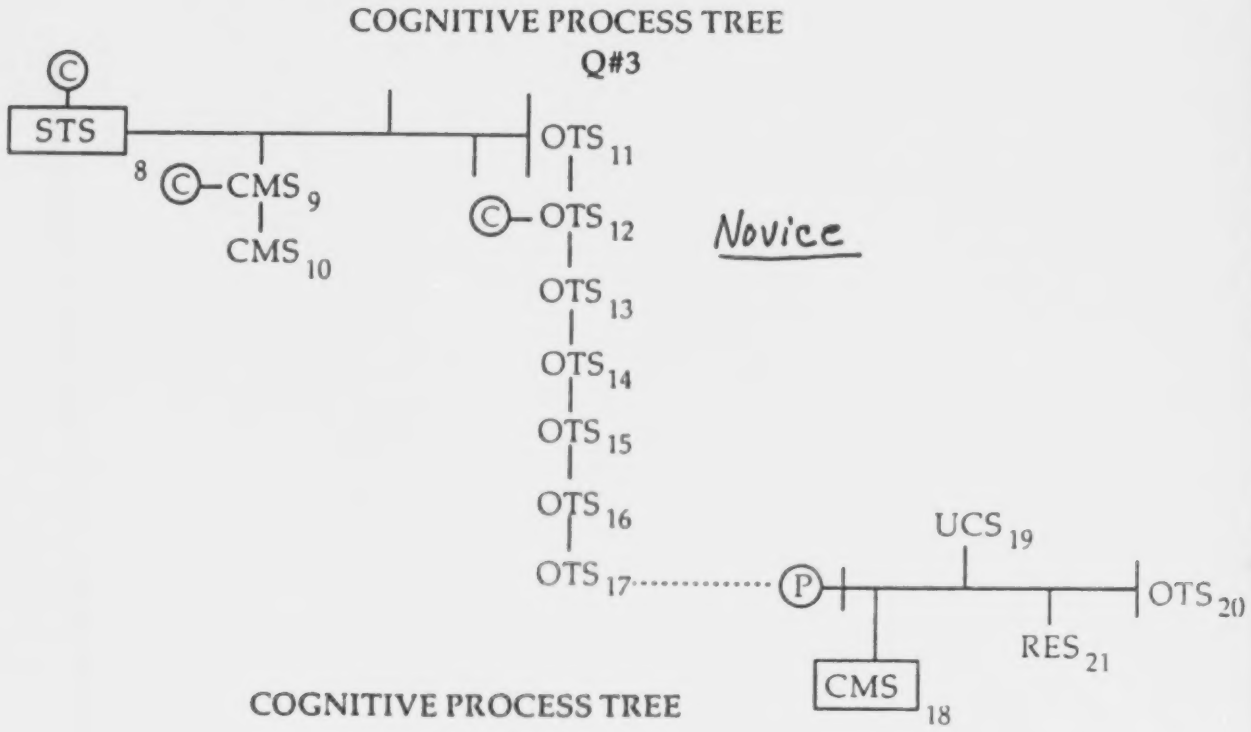


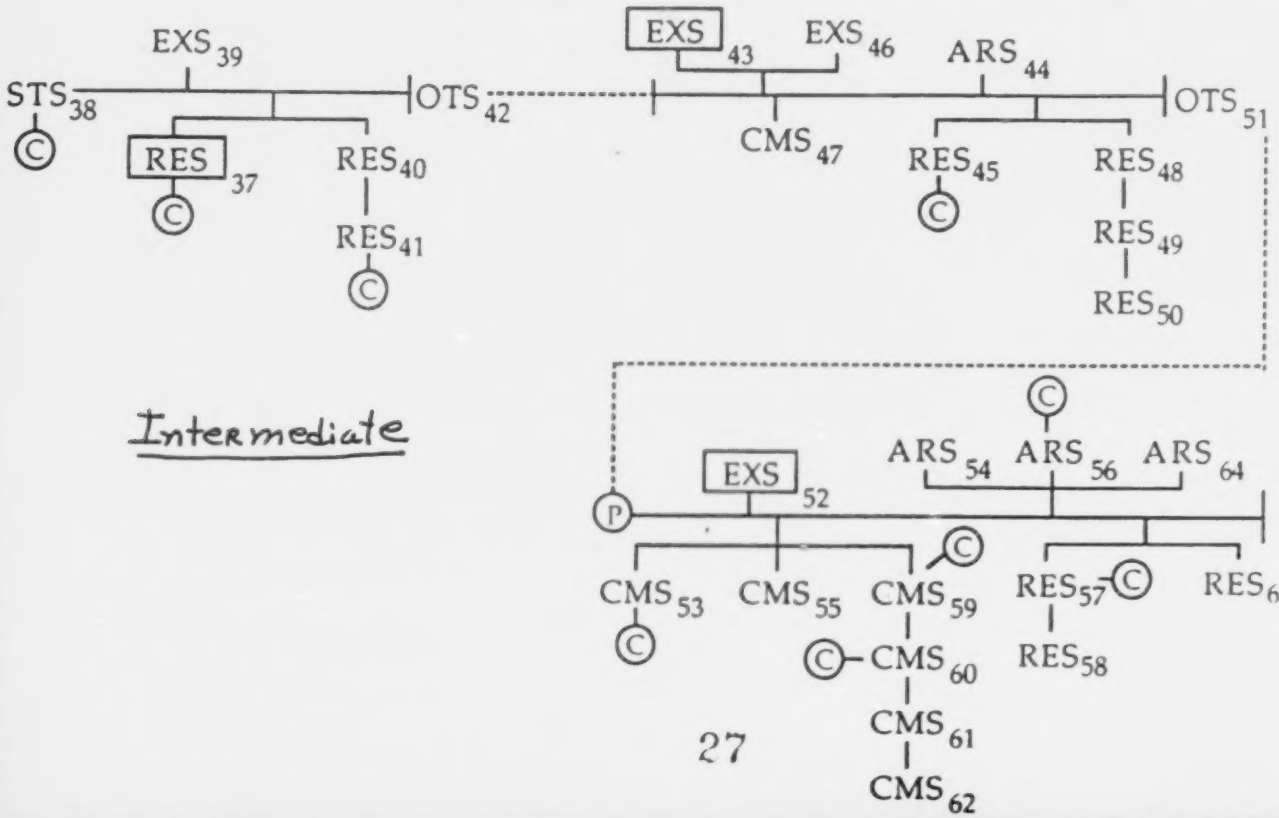
COGNITIVE PROCESS TREE E131

Q#1



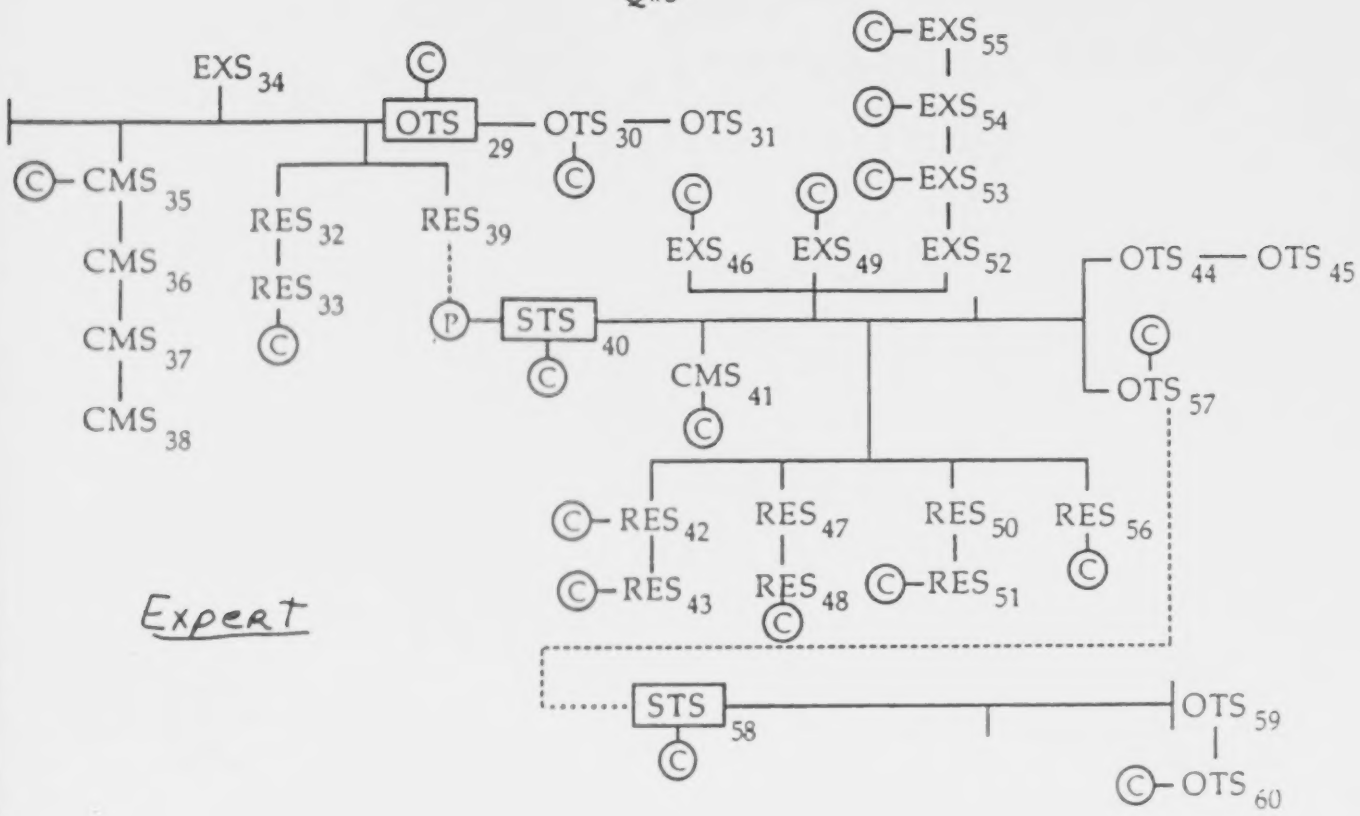
Example 3


COGNITIVE PROCESS TREE
Q#3
STS
8
CMS 9
CMS 10
OTS 11
OTS 12
OTS 13
OTS 14
OTS 15
OTS 16
OTS 17
Novice
UCS 19
P
OTS 20
RES 21
CMS 18


COGNITIVE PROCESS TREE
Q#3
STS 38
EXS 39
RES 37
RES 40
RES 41
OTS 42
EXS 43
EXS 46
CMS 47
ARS 44
RES 45
RES 48
RES 49
RES 50
OTS 51
Intermediate
P
EXS 52
CMS 53
CMS 55
CMS 59
CMS 60
CMS 61
CMS 62
ARS 54
ARS 56
ARS 64
RES 57
RES 58
RES 63

COGNITIVE PROCESS TREE

Q#3



Expert

APPENDIX B

Table 13

Housing Concepts Expressed by Group Within Budget and Finance Category

Expert	Intermediate	Novice
financial resources	generating taxes	credit & finance
mortgage considerations	support systems	landlords
taxes/taxation	services for residents	supply/demand
average costs	cost components	30% of income
finance and technology relationships	high interest rates	mortgage rates
holistic economies	financial capabilities	income levels
personal income	economical use of resources	economy of houses
functioning mkt systems	capital gains	buying homes
gender equality	money availability	
supply/demand	depreciation	
housing mkt survey	real value	
bundle of services	tax benefits	
counter cyclical mkts	contract for deed	
Federal Reserve interest & reserve requirements	total housing costs	
	pay motives	
	time affordability	
appreciating homes	25% income for mortgage	
stock portfolio/homes	low interest loans	
building equity	non-profit private developers	
equity as risk money	market analysis	
market rate investment		
resyndication		
housing models		
fixed mortgages		
income side		
fluidity in housing mkt		
economic risks		
future mkt value		
inflationary changes		
international lending		
new mortgage institutions		
opportunity costs in housing		
availablity of resources		
two tier economy		
unmet demand for housing		
private/public markets		
tenure decisions		
demand for new units		

Table 2

One-Way Analysis of Variance for Test Scores, Years of Schooling, and Years of Work Experience

	Ranking of scores/years			
	Experts	Intermediates	Novices	H value
Test scores	30	29	6	-17.11*
Years of schooling	46	34	11	8.29*
Years of work experience	46	38	7	9.87*

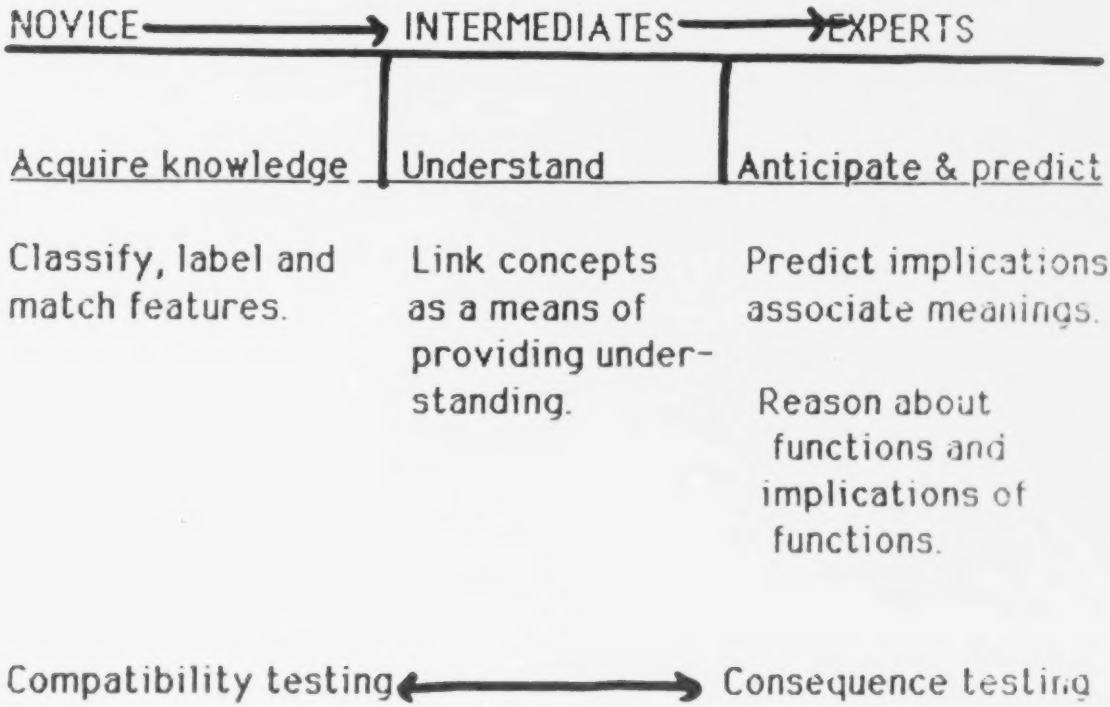
* $p < .05$

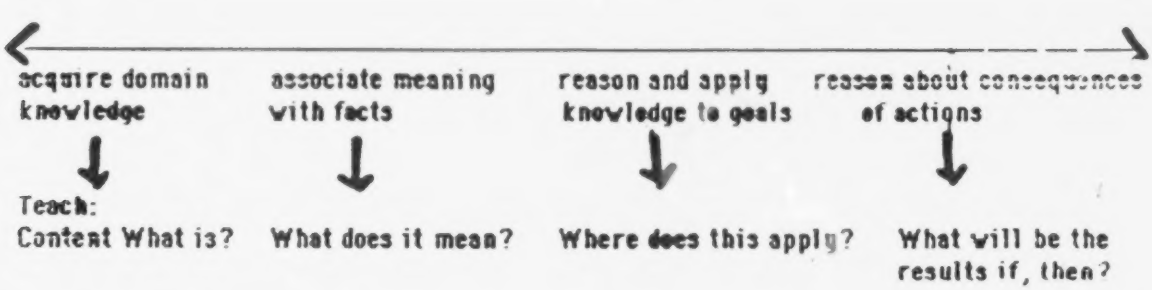
df = 2

FIGURE I

IMPLICATIONS FOR INSTRUCTIONAL DESIGN

Cognitive Development




acquire domain knowledge
associate meaning with facts
reason and apply knowledge to goals
reason about consequences of actions
Teach:
Content What is?
What does it mean?
Where does this apply?
What will be the results if, then?